

### Abstract of the Disclosure

A digital multiplication apparatus and method adopting a redundant binary arithmetic is provided. In this digital multiplication apparatus, when two numbers X and Y are multiplied using a radix- $2^k$  number system, a data converter data-converts the m-bit number Y into  $m/k$ -digit data D ( $= D_{m/k-1}D_{m/k-2} \dots D_i \dots D_1D_0$ ). A partial product calculator converts each of the digits  $D_i$  of the number Y converted by the data converter into a combination of the coefficients of a fundamental multiple, multiplies the combination by the number X, and outputs the product as a redundant binary partial product. A redundant binary adder sums the partial products for all of the digits of the converted number Y. A redundant binary (RB)-normal binary (NB) converter converts the redundant binary sum into a normal binary number and outputs the converted normal binary sum as the product of the two numbers.

Therefore, even when the radix extends, the burden upon hardware can be minimized. Also, many systems having multipliers serving as important components can be more simply constructed.